Two Moss Species of the Genus *Pottia* Collected from the Vicinity of Syowa Station, East Antarctica

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昭和基地周辺から採集された *Pottia* 属の 2 種

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要旨: 昭和基地周辺から採集された蘚類 2 種 *Bryum antarcticum* HOOK. f. et WILS. ならびに "*Desmatodon* sp." (NAKANISHI, Nankyoku Shiryô (Antarct. Rec.), **59**, 68, 1977) の分類学的帰属について検討された. *Bryum antarcticum* には, ほぼ完熟した胞子体が発見されており, その形態と配偶体の特徴によって, 本種を *Pottia heimii* (HEDW.) HAMPE のシノニムとして扱った. *Bryum antarcticum* の基準標本の詳細な観察により, 葉細胞に痕跡状のパピラが見つかり, しかも幼葉の細胞にはかなり顕著なパピラが確認された. これによって, 本種の基準標本と昭和基地の標本および西南極の標本はいずれも *Pottia heimii* の幅広い変異域の中に含まれると考えられる. ソ連のオアシス基地周辺で報告されている *P. heimii* var. *brevinervis* LYD. SAVICZ. et Z. SMIRN. も多くの標本との比較によって *Pottia heimii* のシノニムとして扱われた.

一方, "*Desmatodon* sp." は葉形, 葉細胞の大きさ, 葉縁細胞の分化と鋸歯, 生育環境などの特徴によって *Pottia austro-georgica* CARD. に該当すると考えられる. 本種は今までに, サウス・ジョージア島, サウス・オークニー諸島, サウス・サンドイッチ諸島に報告されているのみで, 著しい不連続分布を示すことになる. また, サウス・シェトランド諸島のキング・ジョージ島で 2 カ所の新産地を確認した.

Abstract: Taxonomic reviews were made on two moss species, *Bryum antarcticum* HOOK. f. et WILS. and so-called "*Desmatodon* sp." collected from the Syowa Station area, East Antarctica. *Bryum antarcticum* was concluded to be synonymous with *Pottia heimii* (HEDW.) HAMPE from the study on type specimen and matured sporophytes which were found in a collection from the Syowa Station area. "*Desmatodon* sp." should be assigned to *Pottia austro-georgica* CARD. which has been known in the neighboring islands of the Antarctic Peninsula. *P. austro-georgica* is recorded from the South Shetland Islands for the first time.

1. Introduction

Six species of mosses have hitherto been known from the vicinity of Syowa Station, East Antarctica. Three of them, *Bryum argenteum* HEDW., *B. inconnexum* CARD. and

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Ceratodon purpureus (HEDW.) BRID. were first reported by HORIKAWA and ANDO (1961). In that study, they commented briefly on *Bryum antarcticum* HOOK. f. et WILS., which had been known within the Antarctic botanical zone, pointing out that it was different from *B. inconnexum* in the leaf-shape and -margins, though the two species seemed to resemble each other. They (HORIKAWA and ANDO, 1967) also referred to *B. antarcticum* that, according to their private communication with S. W. GREENE, this species was essentially different from other species of *Bryum*, and they queried its generic position. Recently NAKANISHI (1977) added three other species to the flora previously known from the Syowa Station area, namely, *B. antarcticum*, *Desmatodon* sp. and *Grimmia lawiana* J. H. WILLIS. The specimens of *B. antarcticum* found near Syowa Station provided some interesting aspects, suggesting its disposition in the Pottiaceae.

Desmatodon sp. reported by NAKANISHI (1977) constitutes a first record of this genus in Antarctica. The identification of this specimen, however, is not easy because of its sterile condition. As this specimen has been tentatively identified as the genus *Desmatodon* of Pottiaceae, further examination is required for its taxonomy.

I had a chance to join the 19th Japanese Antarctic Research Expedition (JARE-19) during 1977–1978 and to work on the moss flora and ecology of the Sôya Coast and the Prince Olav Coast. I had also an opportunity to take part in the 33rd Chilean Antarctic Research Expedition in 1979 and visited some localities of the South Shetland Islands. During these expeditions, I could fortunately observe several habitats of these two mosses.

The present study is the results of my study on these two mosses in the Antarctic region based on the types and other materials.

2. Results and Discussion

2. 1. *Bryum antarcticum* HOOK. f. et WILS.

Bryum antarcticum was first collected by Joseph HOOKER from Cockburn Island in 1843 and was described as new species by WILSON and HOOKER (1847). Since then this species had been reported from the McMurdo Sound by CARDOT (1907, 1910) and from the Mac. Robertson Land by CLIFFORD (1957). Thus, this species has been considered to be endemic to the Antarctic region. In the study of the present author, it was proved that the CLIFFORD's specimen is actually *Bryum algens* CARD. s. str. and the material reported from the same area by FILSON (1966) as *B. antarcticum*, judging from the description, seems to be *B. algens* s. str. RASTORFER (1971) succeeded in making matured sporophytes of *Bryum antarcticum* experimentally from the colony mixed both of androgynous and gynoecial plants. This experiment is epoch-making

for the elucidation of reproductive system in Antarctic mosses, but unfortunately the material used was not real *Bryum antarcticum* but *B. algens* s. str. Such taxonomic confusions are probably caused by that DIXON and WATT (1918) had mistakenly synonymized some bryaceous species with *B. antarcticum*, namely *Bryum austro-polare* CARD., *B. inconnexum* CARD., *B. gerlachei* (CARD.) BROTH., *B. algens* CARD. and *B. filicaule* BROTH. BARTRAM (1938) and STEERE (1961) followed their treatment, but HORIKAWA and ANDO (1967), ROBINSON (1972), GREENE (1967, 1968), ANDO (1979) and OCHI (1979) did not agree with DIXON and WATT's treatment because DIXON and WATT did not see the type specimens of these species. ROBINSON (1972) was the first to suggest that this species should be assigned to Pottiaceae and reminiscent of the genus *Acaulon*, but he did not try to discuss its generic position from morphological features.

Some substantial contributions to the taxonomic position of this species were derived from the bryological investigations in the vicinity of Syowa Station. Among them, NAKANISHI's (1977) report is essentially noteworthy to discuss this problem; he proved that the species should be included in Pottiaceae because of its karyological nature and nearly matured sporophytes. INOUE (1976) clarified the chromosome formula of *B. antarcticum* from near Syowa Station as $k(n)=26+2$ acc., and he considered that this species belongs to Pottiaceae, because its chromosome number is associated with the basic number of Pottiaceae, $X=13$. NAKANISHI (1977) later collected nearly matured sporophytes of this species near Syowa Station. Judging from the vaucher specimens, its sporophyte has some important aspects, *e.g.*, cuculate calyptra and erect capsule with long rostrate lid. Recently OCHI (1979) suggested that it is not a species in the genus *Bryum* nor *Pohlia*, but it appears to belong to Funariaceae or Pottiaceae.

By all accounts stated above on the plants from Syowa Station, this species in the vicinity of Syowa Station is considered to be a species of the Pottiaceae, among which the genus *Pottia* is most probable.

On the other hand, concerning the sporophyte of *B. antarcticum* in the type specimen, WILSON and HOOKER (1847) described a very young sporophyte in a few words. However, the description is not useful enough to presume its taxonomical position. According to GREENE (1967), young and immatured sporophytes of this species have been noted once at Cape Bernacchi and once at Marble Point, Southern Victoria Land, but since these capsules were all aborted, the fruiting success is doubtful. These facts may indicate that this species will be able to produce the sporophyte in natural condition in East Antarctica.

2.1.1. *Bryum antarcticum* HOOK. f. et WILS. collected around Syowa Station (Fig. 1)

I also collected some materials of *Bryum antarcticum* with perfectly matured sporophytes in Skallen, about 100 km SW of Syowa Station. The habitat is close to

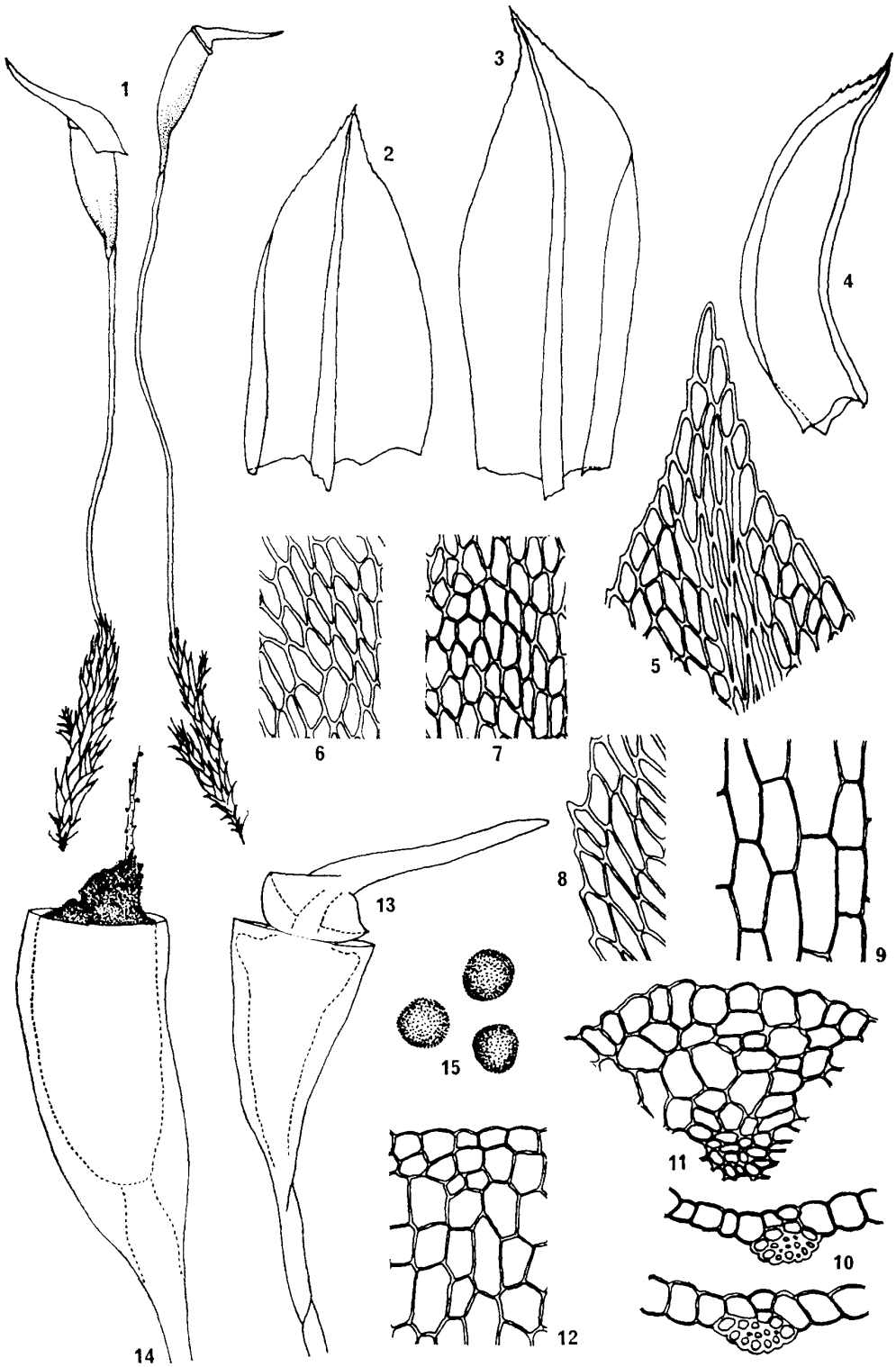

Fig. 1. *Pottia heimii* (HEDW.) HAMPE (drawn from NIPR-780823-002). **1.** Plants, ×7. **2–4.** Leaves, ×70. **5.** Apical part of leaf, ×200. **6, 7.** Median cells of leaf, ×200. **8.** Marginal part of upper leaf, ×200. **9.** Basal cells of leaf, ×200. **10.** Cross section of costa, ×200. **11.** Cross section of stem, ×200. **12.** Exothecial cells, ×200. **13, 14.** Capsules, ×17. **15.** Spores, ×260.

the seashore and the substratum is composed of granitic gneiss and limestone. Based on this material (no. 780823–002, NIPR), the following description was prepared.

> Plants medium to large, 3–5 cm high, forming compact turf, green to yellowish-green or straw-colored, somewhat lustrous, dark brown below, often intermingled with *Bryum pseudo-triquetrum* (=*B. inconnexum*) or *Ceratodon purpureus*. Stems with central strands, radiculose at base, simple or branched; leaves imbricate in the upper part of stem, obovate or ovate-lanceolate, *ca.* 1.0 mm long, 0.6 mm wide, short to long-acuminate, the upper part with yellow or brown coloration, concave, often keeled; median cells pale green to yellow or brown, entirely smooth, elongate-hexagonal or rectangular or oblong-rhomboid in shape, thick-walled, 27–46 μm long, 11–18 μm wide, basal cells much larger, 60 μm long, 20 μm wide, lax, thin-walled; margins usually very weakly bordered with short-quadrate cells but sometimes not clear, minutely or weakly crenulate at the upper margins; costa strong, short-excurrent; leaf apex often hyaline forming a short piliform. Perichaetial leaves long, *ca.* 1.2 mm long, 0.5 mm wide, with strong excurrent costa and long acumen; setae 0.8–1.5 cm long, usually sinistrorse; calyptra cuculate, long-cylindric; lid conic to long-rostrate, usually connecting with columella; peristome teeth absent; exothecial cells at middle of capsule rectangular to oblong; mouth bordered by 1–3-layered, small and rounded-quadrate cells; spores yellowish- to reddish-brown, minutely papillose, 20–40 μm in diameter.

2.1.2. Type material of *Bryum antarcticum* HOOK. f. et WILS. (Fig. 2)

The type locality of *Bryum antarcticum* is on Cockburn Island, Lat. 64°S, Long. 57°W and the material was collected by HOOKER f. in 1843. Since the publication of this species, no bryologists mentioned about the type specimen; I have found five specimens labeled as *B. antarcticum* by HOOKER (handwriting!) in the British Museum (BM). One of these specimens had sporophytes and agreed well with the original description by HOOKER and WILSON, with label as "*Bryum antarcticum* n. sp., Island, 64°13′S, 57°W, Jan. 6, 1843"; two specimens without sporophytes were labeled as "Cockburn Island, no. 6, *Bryum antarcticum* HOOK. f. et WILS.", and other two specimens were labeled as "*Bryum antarcticum* HOOK. f. et WILS., Island, 64°13′S, 57°W, Jan. 6, 1843", lacking sporophytes. However, the last two specimens are not of *Bryum* but *Barbula* sp. Because these specimens were certainly studied by HOOKER and WILSON, I would like to select the first specimen with sporophytes as the lectotype of *Bryum antarcticum*. The following short description is based on the lectotype.

> Plants small, 0.8–1.0 cm high, densely appressed, yellowish-brown at the upper part, pale brown below. Stems with 3–4 innovations, in cross section with

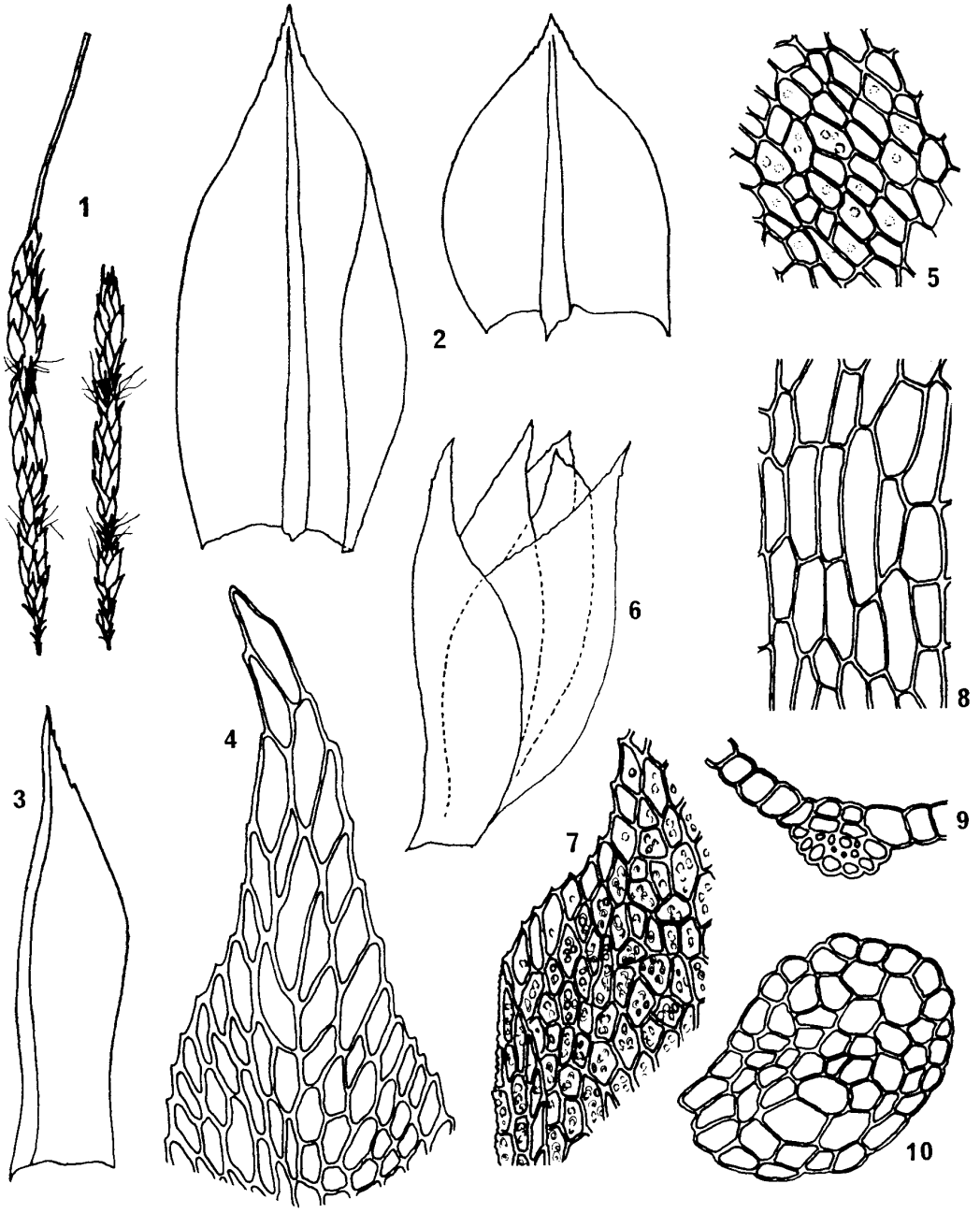

Fig. 2. *Pottia heimii* (HEDW.) HAMPE (drawn from lectotype of *Bryum antarcticum* HOOK. f. et WILS.). **1.** Plants, ×7. **2, 3.** Leaves, ×70. **4.** Apical part of leaf, ×200. **5.** Median cells of leaf, ×200. **6.** Juvenile leaves, ×70. **7.** Papillae on cells of juvenile leaf, ×200. **8.** Basal cells of leaf, ×200. **9.** Cross section of costa, ×200. **10.** Cross section of stem, ×200.

obscure central strands, producing many radicles below; leaves imbricate, obovate-lanceolate, *ca.* 0.4–0.8 mm long, 0.4 mm wide, usually short acuminate, sometimes with long hyaline acumen, concave, often keeled;

median lamina-cells small, 15–25 μm long, 10–12 μm wide, very variable in shape (quadrate, round, oblong-rectangular, rhomboid, or hexagonal), becoming longer toward the leaf apex and base, thick-walled, usually smooth but very rarely with very weak papillae, strongly papillose on the juvenile leaves; margins serrate at the apex; costa weak, nearly percurrent. Perichaetial leaves large; young setae sinistrorse, very short, 3 mm long; capsule fallen.

2.1.3. Comparison of the Syowa Station collection with the type material

The specimen from the Syowa Station area (Skallen, NIPR-780823–002) coincides very well with the type material of *Bryum antarcticum* in the following points: 1) the plants yellow-green, straw-colored and somewhat lustrous at the upper part of stem, 2) the median leaf-cells entirely smooth, elongate-hexagonal or oblong-rhomboid, and 3) the basal leaf-cells gradually or hardly separated from the median. However, this specimen differs from the type material in some features, such as the larger size of plants, reaching 5 cm high (*ca.* 1 cm high in type material); the larger cells of leaf, 27–46 μm long, 11–18 μm wide (15–25 μm long, 10–12 μm wide in type material), and the yellow or brown coloration at the upper part of leaf. However, these differences observed do not seem to be genetical and they seem to be included in the range of variation of *Bryum antarcticum*.

The above observations on the type specimen and the Skallen specimens of *Bryum antarcticum* suggested that this species cannot be included in *Bryum*, because of 1) the strongly concave and keeled leaves, 2) the oblong-rhomboidal leaf-cells, 3) the scarcely developed (or sometimes undeveloped) papillae on leaf-cells, 4) the weak serrations at the upper leaf-margin, and 5) the cuculate, cylindrical calyptra, and the capsule entirely lacking peristome teeth. These characteristics enumerated above immediately suggested that this species should be included in the genus *Pottia* as circumscribed in the literature.

Among the species of *Pottia*, the specimens identified as *B. antarcticum* from the Antarctic region (including the Skallen and the type materials) seem to be very similar to rather polymorphic *P. heimii* (HEDW.) HAMPE. According to MATTERI (1977b) who revised *P. heimii* of the Antarctic botanical zone, the papillae on leaf cell frequently become poorly developed or absent so that the cells look completely smooth.

2.1.4. Taxonomic conclusion and a list of specimens

In conclusion, *Bryum antarcticum* is more appropriately considered to be included in the specific concept of *Pottia heimii*.

Pottia heimii (HEDW.) HAMPE, Flora **20**: 287 (1837).

Bryum antarcticum HOOK. f. et WILS., Flora Antarct. **2**: 414 (1847), syn. nov.

Pottia charcotii CARD., Compt. Rend. Ac. Sc. Paris **153**: 602 (1911).

P. heimii var. *brevinervis* LYD. SAVICZ et Z. SMIRN., Natul. Syst. Sect. Cryptog. Inst. Bot. Acad. Scient. U.S.S.R. **16**: 193 (1963), syn. nov.

P. heimii var. *charcotii* (CARD.) LYD. SAVICZ et Z. SMIRN., Natul. Syst. Sect. Cryptog. Inst. Bot. Acad. Scient. U.S.S.R. **16**: 193 (1963).

Specimens examined: EAST ANTARCTICA. **Syowa Station Area.** *Akebono Rock,* 68°05′S, 42°50′E, NIPR-770823–097, 098, 099 (T. HOSHIAI). *East Ongul Isl.,* 69°01′S, 39°35′E, NIPR-770823–008, 048, 058 (T. MATSUDA). *Langhovde,* 69°13′S, 39°45′E, NIPR-761108–010 (H. SHIMIZU 751126304), NIPR-761109–085 (H. SHIMIZU 751114278), Naka-no-tani Valley, NIPR-761109–080 (H. SHIMIZU 750516011), Yatude Valley, NIPR-761104–004 (H. SHIMIZU 750517050), Hamne, NIPR-761109–021 (H. SHIMIZU 751125291), Yukidori Valley, NIPR-761109–016 (H. SHIMIZU 750517001). *Hamnenabben,* 69°17′S, 39°41′E; NIPR-761109–050 (H. SHIMIZU 751113272). *Breidvågnipa,* 69°21′S, 39°46′E; NIPR-761109–044 (H. SHIMIZU 750519027). *Skarvsnes,* 69°28′S, 39°39′E; NIPR-761101–002, 761109–065 (H. SHIMIZU 750131070, 750630071), Torinosu Cove, NIPR-761109–026 (H. SHIMIZU 750127014), Torinosu Bay, NIPR-761029–003 (H. SHIMIZU 750127004), NIPR-800711–016 (S. NAKANISHI 289), Mt. Suribati, NIPR-761109–084 (H. SHIMIZU 751104215), NIPR-800710–040 (S. NAKANISHI 237), Mt. Tenpyô, NIPR-761108–002 (H. SHIMIZU 751104194), Lake Suribati, NIPR-780824–028 (H. KANDA 190177), Lake Oyako, NIPR-780824–048 (H. KANDA 190318), NIPR-800710–084 (S. NAKANISHI 288). *Skallen,* 69°39′S, 39°25′E, Magoke Pt., NIPR-780822–101, 780823–002, 006, 007 (H. KANDA 190371, 376, 377, 379, 380), Lake Skallen Ôike, NIPR-780823–020 (H. KANDA 190339). *Skallevikhalsen,* 69°41′S, 39°18′E; NIPR-761109–029 (H. SHIMIZU 751029136). *Rundvågskollane,* 69°50′S, 39°09′E; NIPR-761109–024 (H. SHIMIZU 751023044). *Rundvågshetta,* 69°53′S, 39°00′E; NIPR-761026–073, 761029–019, 761109–022, 043 (H. SHIMIZU 751021024, 25, 16, 23). **Oasis Station Area.** *Bunger Hills,* 66°17′S, 100°47′E; 10/410, 12/558 in LE (M. M. HOLLERBACH, as *Pottia heimii* var. *brevinervis*). **South Victoria Land.** *Marble Pt.,* 77°26′S, 163°50′E, NIPR-770823–088 (H. FUKUSHIMA 808). *Strand Moraines,* 77°45′S, 164°31′E; IAA-03100008 (W. C. STEERE and S. W. GREENE). WEST ANTARCTICA. **Terre de Graham.** *Cap des Trois Perez,* 65°24′S, 64°06′W; type of *Pottia charcotii* in PC (GAIN 272b). *Cockburn Island,* 64°13′S, 57°W; HOOKER f. lectotype (selected here) of *Bryum antarcticum* in BM, HOOKER f. no. 6 in BM. **South Shetland Islands.** *King George Island,* Potter Cove, 62°14′S, 58°40′E, NIPR-790609–077, 080, 082, 085, 091, 092 (H. KANDA). **Elephant Isl.** 61°10′S, 55°14′W; Shackleton Ant. Exp. 1916 in BM (R. S. CLARK).

2.1.5. Distribution of *Pottia heimii* within the Antarctic botanical zone

GREENE (1967) showed the distributional map of *Bryum antarcticum*, in which he located it from East Antarctica only on the transantarctic mountain. Accordingly, the distribution of *Pottia heimii* in the Antarctic botanical zone must be modified with some additions to the contribution of GREENE (1967) and MATTERI (1977b).

SAVICZ-LJUBITZKAJA and SMIRNOVA (1963) reported two varieties of *P. heimii*, namely, *P. heimii* var. *brevinervis* LYD. SAVICZ. et Z. SMIRN. and *P. heimii* var. *charcotii* (CARD.) LYD. SAVICZ. et Z. SMIRN. from the Bunger Hills, 67°S, 110°E. As MATTERI (1977b) already pointed out, the type material of var *charcotii* was only a modification

of *P. heimii* var. *heimii*. Although I was not able to locate the type of var. *brevinervis*, judging from the specimens collected from the Bunger Hills (Coll. M. M. HOLLERBACH, no. 10/410, 12/558), the type locality of var. *brevinervis*, its leaf apex is short-acuminate and its costa disappears below the leaf apex, so that this specimen is similar to an arctic species, *P. heimii* var. *arctica* (=*P. obtusifolia*). But the former is not obtuse in leaf apex like the latter and it seems to belong to the vast range of *P. heimii* var. *heimii* by shape of the leaf and leaf cells and by papillosity on leaf cells. Thus, the distribution of *P. heimii* expands to further eastern areas of Antarctica. It remains for further discussion to define the nature and range of variation of *P. heimii* of the circum-Antarctica.

2. 2. "*Desmatodon* sp."

2.2.1. "*Desmatodon* sp." from near Syowa Station and its taxonomical treatment

The record of the genus *Desmatodon* from Antarctica was made by NAKANISHI (1977). Although his materials were all sterile plants, the gametophyte features, such as leaf apex, papillae at leaf cells, etc., extremely similar to *Desmatodon obtusifolius* (SCHWAEGR.) SCHIMP. or to *D. laureri* (SCHULZ.) B.S.G. The chromosome number of $k(n)=26$ of this species was shown by INOUE (1976), and it was suggested that this species belongs to the Pottiaceae and is somewhat related to the $k(n)=26+2$ acc. of *Pottia heimii* (=*Bryum antarcticum*). CRUM (1969) insisted that there are no conspicuous characteristics to separate *Desmatodon* from *Pottia*, and he adopted the opinion that *Pottia heimii* should be included in *Desmatodon*.

Based on the material (no. 780824–052, NIPR) of *Desmatodon* sp. from Skarvsnes near Syowa Station, a short description is given as follows:

> Plants small to medium, 0.5–1.5 cm high, in more or less loose to dense turf, dull green to yellowish-brown, not lustrous, often associated with *Pottia heimii* (=*Bryum antarcticum*). Stems with central strands, radiculose at base, simple or branched; leaves slightly twisting at the top of stem, imbricate, long ovate-lanceolate, long-acuminate, *ca.* 1.3 mm long, 0.4 mm wide, concave, rarely keeled; median cells green to dark green, obscure, variable in shape such as round, elliptic, hexagonal, or quadrate, small, 10–14 μm long, 10–15 μm wide, with usually dense C-shaped or circular papillae, basal cells much larger, lax, thin-walled, clearly distinguished from the median; margins strongly serrate, usually prominently bordered by 1–4 rows of hyaline, epapillate cells, reaching to the apex from about basal 1/3 the leaf length; costa very strong, short-excurrent, in cross section usually plane-convexed.

Although this specimen has no sporophytes, it is distinguished from *P. heimii* by several characteristics, *e.g.*, plants dull green; lamina-cells of leaf obscure, strongly

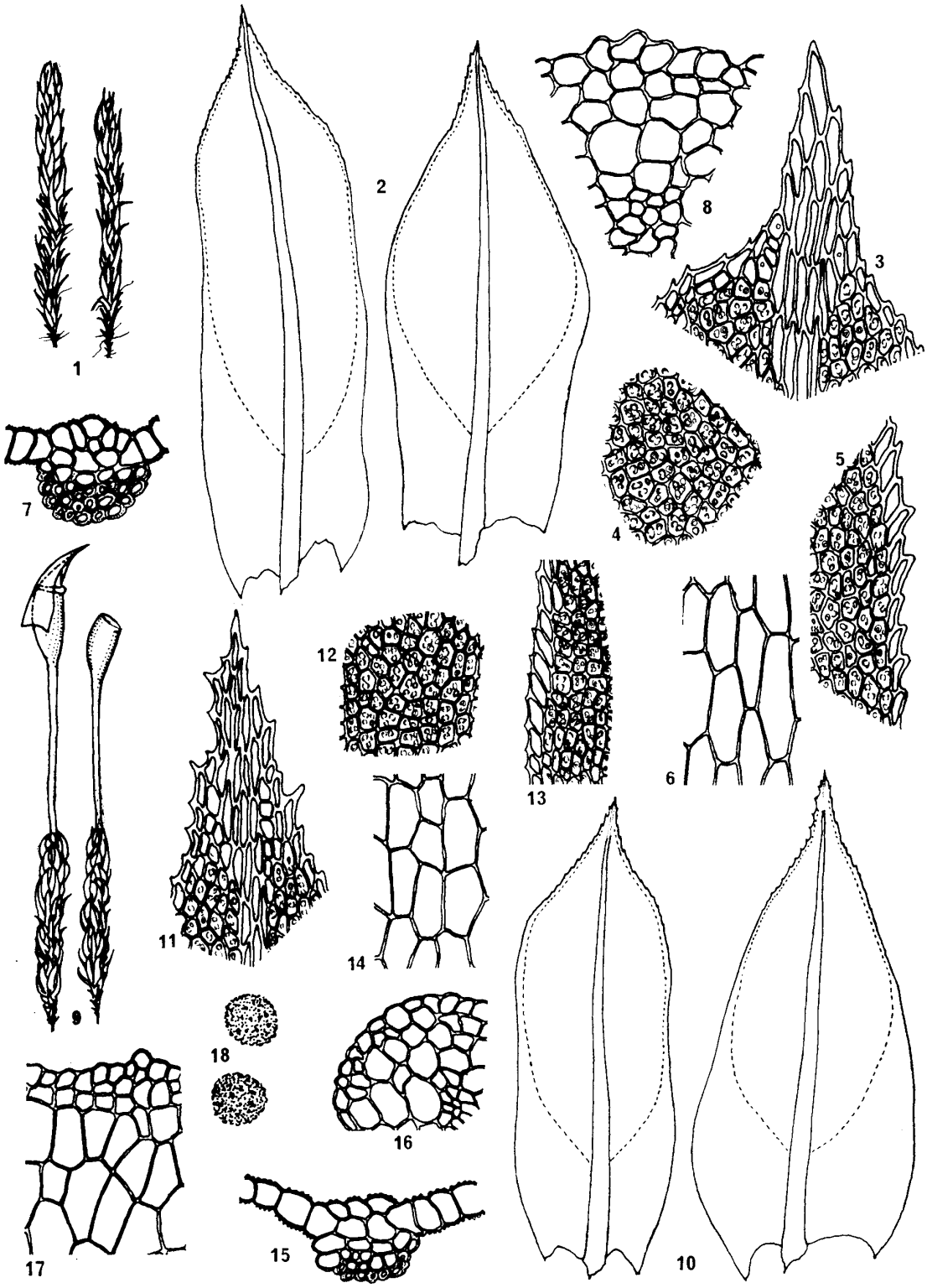

Fig. 3. *Pottia austro-georgica* CARD. (1–8: drawn from NIPR-780824–052. 9–18: drawn from NIPR-790609–017). **1, 9.** Plants, ×5. **2, 10.** Leaves, ×70. **3, 11.** Apical part of leaves, ×200. **4, 12.** Median cells of leaves, ×200. **5, 13.** Marginal part of leaves, ×200. **6, 14.** Basal cells of leaves, ×200. **7, 15.** Cross section of costae, ×200. **8, 16.** Cross section of stem, ×200. **17.** Exothecial cells, ×200. **18.** Spores, ×260.

papillose, variable in shape as round, elliptic, quadrate or hexagonal, smaller, 10–14 μm long, 10–15 μm wide; borders at the distal 2/3 of leaf margins distinct, and serration at leaf margins strong. These characteristics of "*Desmatodon* sp." from Skarvsnes seem to indicate that this species should be identified with *Pottia austro-georgica* based on a comparison with the type material of this species (C. SKOTTSBERG 290, South Georgia, Royal Bay, Moltke Harbor, PC) and some other authentic specimens from West Antarctica.

MATTERI (1977a) first revised *Pottia austro-georgica* and described it in detail. She insisted that this species is characterized by the following features: presence of toothed, prominent border on leaf-margins, dense papillae of leaf cells, and short stems bearing rigid, erect-patent, dark green leaves. The plants collected near Skarvsnes conform well to the type material of *P. austro-georgica* from South Georgia Island. The sporophyte of this species has some peculiar characteristics as shown by MATTERI (1977b), namely, a short cylindric matured capsule almost completely covered by a long cuculate calyptra and a persistent operculum disconnected to columella. By these two characteristics, this species is clearly different from *P. heimii*.

Pottia austro-georgica CARD., Bull. Herb. Boiss. Ser. 2, **6**: 5 (1906).

P. austro-georgica var. *microphylla* CARD. et BROTH., K. Svensk. Vet. Ak. Handl. **63** (10): 21 (1923).

Desmatodon sp., NAKANISHI in Nankyoku Shiryô (Antarct. Rec.) **59**: 72 (1977).

Specimens examined: EAST ANTARCTICA. **Syowa Station Area.** *Langhovde,* 69°13′S, 39°45′E; NIPR-761109–090 (H. SHIMIZU 751114278), Yatude Valley, NIPR-761109–089 (H. SHIMIZU 750517042), Yotuike Valley, NIPR-800704–085 (S. NAKANISHI 84), Kami-kama, NIPR-800704–086 (S. NAKANISHI 110), Yukidori Valley, NIPR-800704–039 (S. NAKANISHI 57). *Skarvsnes,* 69°28′S, 39°39′E; NIPR-761025–046 (H. SHIMIZU 750100032), Lake Oyako, NIPR-780824–052, 053 (H. KANDA 190321, 22), NIPR-800711–033 (S. NAKANISHI 189), Lake Suribati, NIPR-800711–006 (S. NAKANISHI 271). *Skallen,* 69°40′S, 39°20′E; Lake Skallen Ôike, NIPR-780823–018, 019, 021 (H. KANDA 190337, 38, 40). WEST ANTARCTICA. **South Shetland Islands.** *King George Island,* 62°S, 58°15′W; Potter Cove, NIPR-790609–017, 018, 086, 101 (H. KANDA). Point Thomas, NIPR-790619–017 (H. KANDA). **South Orkney Islands.** *Signey Island,* 60°43′S, 45°38′W; Islas Orcadas del Sur, Herb. Valparaíso Univ. (SMITH 336). **South Georgia Isl.,** 54°15′S, 36°45′W, Royal Bay, Moltke Harbour, type in PC (C. SKOTTSBERG 290).

2.2.2. Habitat and distribution of *Pottia austro-georgica* CARD.

In the Syowa Station area, it is very difficult to find this species in natural habitat because of rather small colonies, at most of *ca.* 10 cm^2. They usually grow on the calcareous sandy soil by the seashore. On the contrary, *Pottia heimii* is different from *P. austro-georgica* in forming larger colonies of 5–10 m^2. As far as my observation at Potter Cove, King George Island, the South Shetland Islands is concerned, *P.*

heimii grows on sandy soil by the seashore, and it often grows even on whale bones scattered there. While *P. austro-georgica* is usually found in calcareous sites near the seashore growing on soil in cracks of rock or cliff, or on soil exposed by erosion on a slope. In the case of Potter Cove, this species grows even in the inland area.

This species has already been reported in South Georgia Island, South Sandwich Islands and South Orkney Islands (MATTERI, 1977b). In addition to these regions, I confirmed its occurrence at Potter Cove and Thomas Point in King George Island (Fig. 3, 9–18). This is new to the South Shetland Islands. Furthermore, it is distributed extremely discontinuously in the Antarctic Peninsula including its neighboring islands and Syowa Station, East Antarctica. This seems to be an interesting phenomenon in the Antarctic moss flora.

Pottiaceous taxa which have hitherto been reported from East Antarctica including the McMurdo Sound include *Sarconeuron glaciale* (C. MUELL.) CARD. et BRYHN, *Bryoerythrophyllum recurvirostre* (HEDW.) CHEN var. *antarctica* LYD. SAVICZ et Z. SMIRN., and *P. heimii*. In the vicinity of Syowa Station of East Antarctica, only two species, *P. heimii* (usually without papillae on leaf cells) and *P. austro-georgica* (usually with prominent papillae on leaf cells) were detected.

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